

***What is claimed:***

1. A control system for a shell-type nuclear reactor, comprising a set of technical means for limiting an increment rate in reactivity by operating devices and for automatically shutting down a nuclear reactor, wherein the said set of technical means comprises actuators provided with motors and connections which transmit the motion from the actuator motors to the operating devices, the latter being disposed within the reactor shell, CHARACTERIZED IN THAT within the reactor shell fixed elements are installed for the purposes of engaging and disengaging the operating devices in such a way that the operating devices become movable by the resultant of the forces continuously acting on the operating devices after their disengagement toward a decrement in reactivity only, each operating device is provided with at least two actuators one of which is common for all the operating devices or for a group of operating devices and moves the operating devices toward an increment in reactivity up to engagement with fixed elements only alternatively one by one after engagement of its motor connection with a selected operating device, and the other one is individual for each operating device and disengages the operating device from a said fixed element in any order relative to the other operating devices by disengaging the connection of its motor to the element engaging the operating device with the said fixed element, the said set of technical means is provided with two-position switches disposed within the reactor shell and having two fixed states depending on the position of the control element for the switch relative to a critical position corresponding to a critical value achieved by one of the parameters defining the safe operation limits for the reactor, the connections of the individual actuator motors to the engagement elements are provided with controlled disengagement elements, made, e.g., in the form of a coupling element, that are disposed within the reactor shell and capable of disengaging the connections for the purpose of moving operating devices toward a decrement in reactivity if the state of the two-position switches corresponds to critical values of the parameters defining the reactor safe operation limits, the connections of the common actuator motors to the operating devices are provided with disengagement elements, made, e.g., in the form of a coupling element, that are disposed within the reactor shell near the shell connector and capable of disengaging the connections when the reactor shell connector is disconnected, the control elements for the two-position switches are made with the possibility of moving the control elements by a common actuator, after the connection of the corresponding motor

engages a selected control element, only to the side corresponding to an induced movement of the operating devices toward a decrement in reactivity.

2. A system according to Claim 1, CHARACTERIZED IN THAT the operating devices are made in the form of rods influencing reactivity and being capable of longitudinally moving from one extreme position to the other without stopping in an intermediate position and without monitoring intermediate positions of the operating devices, the influence of each individual operating device on reactivity being small.

3. A system according to Claim 1, CHARACTERIZED IN THAT the operating devices are arranged relative to the said fixed elements of a reactor with the possibility of being moved by the gravity force or the buoyancy force toward a decrement in reactivity only after being disengaged from the said fixed elements of a reactor if the operating devices are not engaged with the connection of the common actuator motor.

4. A system according to Claim 1, CHARACTERIZED IN THAT an element engaging the connection of the common actuator motor with the operating device is made in the form of a reactor coolant with the possibility of setting said coolant into controlling motion by the common actuator for the purpose of moving an operating device toward an increment in reactivity up to engagement with a fixed element of the reactor.

5. A two-position switch for passive protection of a nuclear reactor, having two fixed states depending on a position of the switch control element relative to a critical position corresponding to a critical value reached by one of the parameters defining the reactor safe operation limits, CHARACTERIZED IN THAT the said control element is made so as to enable the two-position switch going from one fixed state to the other (acting) if the following parameters reach their critical values: thermal elongation of fuel rods of a nuclear reactor, and/or density of a reactor coolant, and/or corrosiveness of a reactor coolant.

6. A two-position switch according to Claim 5, CHARACTERIZED IN THAT the control element of a two-position switch, in order to act at thermal elongation of a fuel rod at a critical value, is made with the possibility of changing its position depending on a difference between the length of a fuel rod and that of a reactor element having a temperature equal to that of a reactor coolant and made either of a material used for making the fuel rod casing, or of a material having the thermal elongation modulus lesser than that of the fuel rod

casing.

7. A two-position switch according to Claim 5, CHARACTERIZED IN THAT the control element of a two-position switch, in order to act when a reactor coolant reaches its critical density, is connected to a float arranged in a chamber filled with the reactor coolant having a temperature and a density corresponding to those of the coolant at the outlet of the reactor core.

8. A two-position switch according to Claim 5, CHARACTERIZED IN THAT the control element of a two-position switch, in order to act when a reactor coolant reaches its critical corrosiveness, is connected to an element arranged in the reactor coolant and made of the material used for making the fuel rod casing in such a way that the said element may be destructed under a given load due to corrosive wear.